



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control

Memorandum

Date December 14, 1983

From Chief, Superfund Implementation Group, CEH

Subject Six Cyanide Chip Sites, Illinois

EPA Region 5 Records Ctr.



351287

To Louise A. Fabinski
Public Health Advisor
EPA Region V

The information which you submitted concerning the subject sites has been reviewed within the Superfund Implementation Group, Center for Environmental Health, Centers for Disease Control. I hope that you will find the following comments useful.

Background

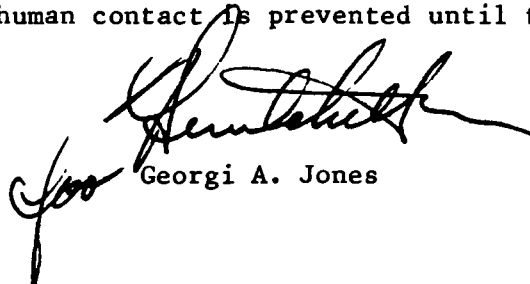
Film chips, which have been treated with cyanide to recover silver, are stored in trailers at each of the sites. Some of the trailers are locked, however, corrosion has caused deterioration of some to the point that the material inside is accessible. Many of the others corrosion has occurred to the point that rain passes through the chips and leaches cyanide from the chips.

Conclusions

The presence of cyanide containing material at sites to which the public has access is a potential public health hazard.

Cyanide containing leachate from the chips permits human access to a possible hazardous condition.

Because of these conditions which provide the potential for a significant health risk, human access to the trailers should be restricted and the leachate controlled so that human contact is prevented until the chips can be disposed of properly.


Georgi A. Jones



Memorandum

Date December 1, 1983

From Chief, Superfund Implementation Group, CEH

Subject Cyanide Chips, Illinois

To Louise A. Fabinski
Public Health Advisor
EPA Region V

The information you provided on the subject site was reviewed within the Superfund Implementation Group, Center for Environmental Health, Centers for Disease Control. I hope that you find the comments useful.

Background

Waste material consisting of broken-up film from which silver has been recovered using cyanide has been disposed of by storage in metal containers which are now deteriorating. Water passing through the containers which comes in contact with the film chips leaches cyanide. Concern has been expressed by people in the vicinity about possible health hazards associated with these containers and the cyanide containing water.

Conclusions

Water containing greater than 0.2 mg/l cyanide should be rejected as a drinking water supply.

Based upon the information available, it appears that humans should be able to ingest 1 mg/day of cyanide with no ill effects. Human exposures three to five times this level has been documented with no problems reported. Single dose exposure ten times this level has been reported with no ill effects.

Air monitoring at the sites should be conducted to determine if the level of hydrogen cyanide exceeds the Estimated Permissible Concentration (EPC).

Discussion

Water:

The 1962 Public Health Drinking Water Standards (12) states:

"The cyanide (CN) standards appear to be based on the toxicity for fish and not for man, as is shown by a comparison that follows (see Table 1) of the safe, toxic, and lethal doses for fish and man. Cyanide in reasonable doses (10 mg or less) is readily converted to thiocyanate in the body. Usually lethal toxic effects occur only when the detoxifying mechanism is overwhelmed. Because proper treatment will reduce cyanide levels to 0.01 mg/l or less, it is

recommended that concentrations in water be kept below 0.01 mg CN/l. For the protection of the health of human populations, concentrations above 0.2 mg CN/l constitute ground for rejection of the supply. Proper chlorination under neutral or alkaline conditions will reduce cyanide to a level below the recommended limit. The acute oral toxicity of cyanogen chloride, the chlorination product of hydrogen cyanide, is approximately one-twentieth that of hydrogen cyanide (9)."

The National Interim Primary Drinking Water Regulations (11), which were promulgated on December 24, state that because of these previously presented considerations (in the 1962 PHS Standards), and because cyanide occurs, however rarely, in drinking water primarily as the result of spills or other accidents, there appears to be no justification for establishing a Maximum Contaminant Level for cyanide.

Thus, based upon the information available, it appears that humans should be able to ingest 1 mg/day of cyanide with no ill effects. Human exposures three to five times this level has been documented with no problems reported. Single dose exposure ten times this level has been reported with no ill effects.

Air:

Air concentrations of hydrogen cyanide should be considered as a possible avenue of exposure from the sites. The Threshold Limit Value (TLV) for hydrogen cyanide is 10 mg/m³. A factor to convert the TLV to an acceptable level for the general environment that is in widespread use ranges from 375 to 440. The EPA publication, Multimedia Environmental Goals for Environmental Assessment (10), presents the development of this factor, in the calculation of the Estimated Permissible Concentration (EPC) and obtains a factor of 420.

$$\begin{aligned} \text{Development of the factor} &= \frac{100 \text{ safety factor} \times 168 \text{ hours/week}}{40 \text{ hours/week workplace exposure}} \\ &= 420 \end{aligned}$$

The EPA, National Environmental Response Team uses the value of 440. Dividing the TLV by the more conservative 440 value produces an EPC for hydrogen cyanide of 0.0023 mg/m³. Air monitoring of the sites should be conducted to assure that excessive levels of cyanide are not developing in the general area.


Georgi A. Jones

TABLE 1.
ORAL TOXICITY OF CYANIDE FOR MAN

DOSAGE	RESPONSE	SOURCE
2.9 - 4.7 mg/day	noninjurious	5
10 mg, single dose	noninjurious	6
19 mg in water	calculated to be safe from TLV	7
50 - 60 mg, single dose	fatal	8

TOXICITY OF CYANIDE FOR FISH

DOSAGE mg/l	EXPOSURE	SPECIES	RESPONSE	SOURCE
0.05	120 hours	trout	death	1
0.1 - 0.2	1 - 2 days	trout	death	2
0.126	170 minutes	trout	overturned	3
0.176	not reported	bluegill	toxic limit	3
1.0	20 minutes	trout	death	1
10.0	90 minutes	carp	death	4
0.02	27 days	trout	survival	1
0.4	96 hours	bluegill	survival	3
0.5	96 hours	bullhead	survival	3

10 mg

2/3 li

human

about the

to

7/15

10 mg

aa

10 mg/
single
dose

y-

42.8%

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